

Patent claims:

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1. An isolated semaphorin protein comprising an amino acid sequence having an N-terminal signal peptide, a Sema domain and, in a C-terminal region, an immunoglobulin-like domain and a transmembrane domain.
  2. The isolated semaphorin protein as claimed in claim 1, wherein the amino acid sequence corresponds to SEQ ID NO.: 3, or a derivative of SEQ ID NO.: 3.
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  3. The isolated semaphorin protein as claimed in claim 1, wherein the amino acid sequence of the Sema domain of the semaphorin protein is at least about 40% homologous to the Sema domain of SEQ ID NO.: 3.
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  4. The isolated semaphorin protein as claimed in claim 1, wherein the amino acid sequence of the protein is at least about 15 to 20% homologous to SEQ ID NO.: 3.
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  5. The isolated semaphorin protein as claimed in claim 1, comprising an amino acid sequence corresponding to SEQ ID NO.: 4.
  6. An isolated nucleic acid molecule encoding a semaphorin protein as claimed in claim 1.
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  7. The isolated nucleic acid molecule as claimed in claim 6, comprising a nucleic acid sequence corresponding to SEQ ID NO.: 41, or a derivative of SEQ ID NO.: 41.
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  8. The isolated nucleic acid molecule as claimed in claim 6 wherein the nucleic acid molecule is a cDNA sequence coding for the semaphorin protein.
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  9. The isolated nucleic acid molecule as claimed in claim 8, wherein the cDNA sequence corresponds to SEQ ID NO.: 1, or to a derivative of SEQ ID NO.: 1.

10. The isolated nucleic acid molecule as claimed in claim 8, wherein the cDNA sequence corresponds to SEQ ID NO.: 2, or to a derivative of SEQ ID NO.: 2.

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11. The isolated semaphorin protein as claimed in claim 1, wherein the protein is phosphorylated, glycosylated or myristylated.

12. A plasmid comprising the nucleic acid sequence as claimed in claim 6.

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13. A plasmid comprising a nucleic acid sequence corresponding to SEQ ID NO.: 41, or a derivative of SEQ ID NO.: 41.

14. A plasmid comprising the nucleic acid sequence as claimed in claim 8.

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15. A vector comprising the nucleic acid sequence as claimed in claim 6.

16. A vector comprising the nucleic acid sequence as claimed in claim 8.

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17. A process for preparing a semaphorin protein as claimed in claim 1, which comprises the steps of:

- cloning a nucleic acid sequence as claimed in claim 6 into an expression vector to form a recombinant vector;
- transforming a cell with the recombinant vector; and
- expressing the protein from the transformed cell.

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18. The process as claimed in claim 17, wherein the transformed cell is a eukaryotic cell.

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19. A process for preparing a nucleic acid molecule encoding a semaphorin protein as claimed in claim 1, comprising amplifying the nucleic acid sequence corresponding to SEQ ID NO.: 41, or a derivative thereof, by the polymerase chain reaction using specific primers.

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- 5 20. A method for identifying immunomodulating agents, which comprises incubating a semaphorin protein as claimed in claim 1 under defined conditions with an agent to be investigated, carrying out a second batch in parallel without the agent to be investigated but under conditions which are otherwise the same, and then determining the inhibiting or activating effect of the agent to be investigated.
- 10 21. A method for identifying immunomodulating agents, which comprises expressing a nucleic acid sequence as claimed in claim 6 under defined conditions and in the presence of an agent to be investigated, and determining the extent of the expression.
- 15 22. An isolated semaphorin antibody which recognizes an epitope corresponding to amino acids 179 to 378 of SEQ ID NO.: 3 or amino acids 480 to 666 of SEQ ID NO.: 3.
- 20 23. A process for preparing an antibody to the semaphorin protein as claimed in claim 1, which comprises the steps of:
- preparing a recombinant plasmid with a fusion protein consisting of of a semaphorin epitope and an epitope tag;
  - transforming a suitable cell with the recombinant plasmid;
  - 25 • purifying the fusion protein from the cells via the epitope tag; and
  - using the purified fusion proteins for immunization.
- 30 24. A method for preventing or treating an immunological disorder which comprises administering to a host in need thereof a pharmaceutical product containing an isolated semaphorin protein or a derivative thereof, as claimed in claim 1.

5 25.A method for preventing or treating an immunological disorder which comprises administering to a host in need thereof a pharmaceutical product containing a nucleic acid sequence as claimed in claim 6 or a derivative thereof.

10 26.A method for preventing or treating an immunological disorder which comprises administering to a host in need thereof a pharmaceutical product containing a nucleic acid sequence as claimed in claim 8.

27.The method according to claim 24 wherein the method is gene therapy.

28.The method according to claim 25 wherein the method is gene therapy.

15 29.A method for modulating an immune response or inhibiting inflammation which comprises introducing the nucleic acid sequence as claimed in claim 6 to a host cell.

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